ENZYME NUTRITION THERAPY
BEYOND A RAW FOOD DIET

Although enzymes are generally associated with raw food and digestion, they have been shown to have clinical uses in treating disease and restoring health.

Part 2 of 3

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THE CHALLENGES OF OUR MODERN WORLD

Dr Edward Howell, the pioneer in the clinical use of plant enzymes, began working at Dr Henry Lindlahr's nature cure sanitarium in the 1920s near Chicago, Illinois. Dr Lindlahr is considered by many to be the "Father of Naturopathy", introducing the modality to the public after his own diabetes was cured by Father Sebastian Kneipp, a nature cure doctor in Bavaria. Father Kneipp used his "cold water cure" and herbs to restore the health of his patients.

Dr Howell's research and observations led him to believe that if he could replace the enzymes lost in cooked and processed food, the nutrients could be better utilised. In 1932 he founded the National Enzyme Company to produce food enzymes to help in digestion. During his clinical practise, he witnessed hundreds of patients' cures from chronic degenerative disease.

Dr Howell advocated at least a 75% raw food diet and taking digestive plant enzymes with the remaining cooked food. In an interview conducted towards the end of his life, he remarked that *even if someone ate a mostly raw food diet, it still would be important to use concentrated plant enzymes*. Replenishing what he referred to as the "enzyme bank" was a sure way to maintain one's health into old age and prevent disease.

While eating an entirely raw food diet would seem ideal, in most cases it would not be realistic for the majority of people at this time. Even the vegetables of the cruciferous family (broccoli, brussels sprouts, cabbage, cauliflower and kale) should not be eaten raw. They contain thyroid-inhibiting factors that should be destroyed by cooking.

Though there is a growing awareness of diet, nutrition and alternative medicine, the average person leaves it to someone else to "fix" them. Thanks to the media's flood of advertisements, they usually rely on over-the-counter drugs. The combination of propaganda and naïveté allows the average person not to take full responsibility for their own health.

Changing the system so that raw food was the main staple of society would demand a complete alteration of the food and medical industry and require re-education on food preparations. It might even challenge belief systems in many cultures. It would confront the largest and most powerful industry in the world: the pharmaceutical/petroleum cartel. Monsanto would be the first to sue anyone having anything to do with it because it would invalidate the corporation's push for global market control of worthless genetically engineered seeds. Only organically cultivated seeds could be used because of the greater enzyme content inherent in the plants once they were grown. All food would be organically grown, not only to prevent the pesticide/herbicide interference with normal bodily enzyme functions but because mineral content in organic food is far more abundant, minerals being necessary co-enzymes. Appliance companies selling microwave ovens would be driven out of business unless they developed new products. All those cooking shows on cable television would have to reinvent themselves by coming up with novel ways to prepare raw food.

There would be an ongoing debate, as there is now, on whether to be vegetarian, since eating raw meat would probably be seen as abhorrently barbaric. Nonetheless, Dr Howell specifically discussed how the Eskimo culture ate raw autolysed meat. Howell points out the original meaning of the American Indian word "Eskimo": "he who eats it raw". The technique of autolysis involves keeping meat in the proper conditions of temperature and moisture for the enzyme cathepsin, found in meat tissue, to break it down slowly. It has been practised for centuries. Traditionally, Eskimos survived brutal winters in the

northern tundra living on raw, pre-digested meats and blubber, without any fruit or vegetables or degenerative disease! When they began eating a "regular" diet of cooked foods high in carbohydrates, they experienced an increase in degenerative disease.

Howell explains there is no evidence that humans can live on an exclusively raw meat diet, but he does make the point for autolysis. The hygienic conditions of those animals raised as food supply would have to be updated so that they lived in extremely clean environments without cages and were free to roam. They in turn would not eat grains but would be pasture fed. Antibiotics and other drugs would be used only in rare instances. This would cost several billion dollars or more to change worldwide. It is doubtful the food and pharmaceutical industry would go along with it. Since the bottom line in any industry is profits, there would be far less profit if farmers and the populace suddenly did not need the majority of pharmaceuticals.

Traditions and cultural implications aside, the socio-economic structures of today's world make it difficult to achieve this change towards eating raw food on a grand scale. Nonetheless, there are small groups around the world who are practising this way of eating. They mostly advocate vegetarianism. Whether being a vegetarian is the most appropriate approach to health is still debatable; it is not to be addressed here. Even vegetarians have major health issues, sometimes far worse than non-vegetarians. What the author is addressing is the clinical use of enzymes as therapeutic tools for preventing and reversing disease and maintaining optimal health.

The therapeutic use of enzymes reveals significant differences between enzymes resulting from animal sources and those of plant origin. Today, animal-based enzymes are primarily derived from the pancreas of freshly slaughtered pigs. They contain the highest enzyme concentrations from animal sources that we know of to date. They have been used since the early 1900s and have been very effective under certain conditions. Some enzymes are obtained from plants, including bromelain from pineapple, papain from papaya and nanokinase from soy fermentation. Other plant-based enzymes are produced from different fungus/mould species by "growing" them. Various enzymes can be cultured from these fungi/moulds in very high concentrations. Contrary to popular belief, these enzymes do not contain any of the substances they were grown from; laboratories manufacturing plant enzymes have independent laboratory assays available to verify this.

Enzymes will not work in a dry environment. They must have moisture.

ENZYME ACTIVATION DEPENDENT FACTORS

Vitamins and minerals are considered essential nutrients and the symptoms of their deficiencies are well documented, often occurring soon after depletion. Signs and symptoms of enzyme deficiencies take much longer to manifest and are very often missed in clinical evaluations.

Enzymes are usually bound to either a mineral or a vitamin, which are co-enzymes. Unlike most vitamins and minerals, enzymes are unique, requiring four specific conditions for activation in order to function:

- moisture (water);
- ideal temperature range;
- the exact pH (alkalinity or acidity);
- a specific substance (substrate) to work on.

Water: The Gift of Life

In order for enzymes to be active, moisture must be present. Enzymes will not work in a dry environment. They must have moisture.

All legumes, nuts and seeds contain enzyme inhibitors. The inhibitors prevent those foods from spontaneously growing, and also nullify the body's own digestive enzymes from working on them. This is why they are so difficult to digest and why we feel tired after eating them. It costs the body great amounts of energy to digest them. Heating will destroy enzyme inhibitors but will also destroy the enzymes themselves. Soaking these foods for at least 12 hours not only destroys the inhibitors but activates the enzymes. Once activated, enzymes will begin breaking down proteins, fats and carbohydrates within the legume, nut or seed, giving the body pre-digested food.

In his book, *Your Body's Many Cries For Water*[1], Dr Fereydoon Batmanghelidj documents chronic dehydration as a causative factor for many health problems such as asthma, arthritis, allergies, back pain, hypertension, migraine headaches and other degenerative diseases. Coffee, alcohol, manufactured beverages and many of the pharmaceutical drugs dehydrate the body. He believes dehydration to be the root cause of many degenerative diseases.

Enzymes are the only substances capable of doing work in the body, but *they need adequate moisture in order to accomplish this.*

Is it possible that dehydration for extended periods inhibits or slows normal enzyme functions which could lead to disease? It may be an academic point of argument. When the body is dehydrated, the blood becomes thick, making normal bodily functioning difficult. Taking aspirin will thin the blood, but not without side effects. Drinking more water will also thin the blood. Supplemental enzymes will thin the blood, but large amounts are required to accomplish this.

There are several ways to view any health crisis and there may be more than one way to remedy it. Finding the safest, most natural and medically sound way of supporting the body to achieve resolution of any health crisis can be challenging for the average person. Having the media thrusting advertisements at them and at the same time spewing propaganda about questionable safety issues of natural remedies, it is no wonder most people are confused and leery.

Some will say: "What about vitamin and mineral depletion in the soil and our food as causative factors in disease? What about our polluted environment—the pesticides, herbicides and industrial waste?" Frankly, it should not take a rocket scientist to conclude how health-damaging our waste and chemical toxicity have become. It is essential to eat organically grown food, while avoiding junk food and food that has been genetically modified, microwaved and/or irradiated. Yet if you eat cooked food, the body will still suffer from enzyme deficiencies. When there is enough of nature's "labour force"—namely, metabolic enzymes and fluid circulating throughout the body—digestion, tissue repair, growth, immune function and detoxification will proceed normally.

Dr Loomis includes a 24-hour urinalysis in his system of evaluation. "Volume" represents how much fluid intake there is and how well the body eliminates it. In relation to chlorides and specific gravity, volume reveals sodium chloride (salt) intake and kidney function respectively. Does one ingest too much salt or not enough? Does the patient drink enough water or too much?

Many people drink too many liquids (not necessarily water) in the belief that they are doing their bodies good by flushing out toxins. While elimination of toxins is beneficial and to be encouraged, excessive fluid intake can deplete and change the electrolyte balance, resulting in numerous other health issues. Rather than guess how much water your body needs, you are advised to follow the recommendations in Dr Batmanghelidj's book.

In addition, utilising Dr Loomis's 24-hour urinalysis will prove to the patient if they are drinking excessive amounts of water, too little water or just the right amounts daily. Adjusting water intake based on a 24-hour urinalysis is a clinically sound method of correcting electrolyte levels and balancing acidic/alkaline conditions.

Temperature

Temperature plays a crucial role in how active enzymes are within the environment in which they are working. Bromelain and papain are two protein-digesting enzymes common in commercial and industrial use. Bromelain is utilised in the meat industry as a meat tenderiser because its ideal temperature range is 120–160°F (48.89–71.11°C). Papain is used in the tanning industry to soften leather. Its optimal temperature is around 105°F (40.56°C). Bromelain and papain have had some success in clinical use as anti-inflammatory agents. However, their limited results might be due to the body's temperature of 98.6°F (37.0°C), which is not ideal for them. Enzymes produced from mould/fungus organisms, however, have an ideal temperature range of 95–105°F (35.0–40.56°C). At the normal body temperature of 98.6°F, plant enzymes from mould/fungus origins are perfect. This will be seen when we discuss fever in part three of this article series.

Animal-based enzymes (pancreatin) are heat labile, as are plant enzymes. Dr Howell noted that heating food at 118°F (47.78°C) or greater, for any length of time, destroys *all* the enzymes.

Pancreatin, which has been used most extensively over the last 80 years, is subject to the same problems faced when manufacturing enzymes in the form of tablets or capsules. Whether the enzymes are from animal or plant origins, when they are produced as a tablet the heat involved in the processing causes a loss of at least 50% of the enzyme activity in those products. Encapsulating enzymes is more advantageous because there is no heat involved and consequently no loss of enzyme activity. There are also no binders, fillers or excipients as in tablets; these have the potential to cause allergic reaction in some people.

Acidity and Alkalinity

One of the other major differences in using animal and plant enzymes is what is known as the *pH factor*. In chemistry, pH is a measurement of the acidity or alkalinity of a substance. Vinegar is somewhat acidic, while hydrochloric and sulphuric acids are highly acidic. Sulphuric acid is contained in car batteries. Hydrochloric acid is used commercially and is produced in the stomach. Lye, on the other hand, is extremely alkaline; it is an ingredient in most commercial products used to unclog plumbing drains. Interestingly, many of the newer plumbing and septic tank cleaners use concentrated *plant* enzymes.

Animal-based enzymes like pancreatin are limited, as they can only work in a pH range of 7.2–9.0, which is alkaline. Stomach acid concentrates down to about 2.0–3.0 during digestion. This is why animal-based enzymes can never digest food, since they are limited to the alkaline end of the pH spectrum.

One of the body's most important functions, monitored by the hypothalamus, is that of keeping the blood pH between 7.35 and 7.45—which, as indicated above, is alkaline. The slightest deviation from this narrow range will throw the body into crisis. Since animal-based enzymes work only in an alkaline environment, they have been shown to work best when taken in between meals to break down unwanted protein such as undigested food remnants, viruses, bacteria and other pathogenic micro-organisms. They are also clinically proven in reducing inflammation.

Most of the original clinical studies using enzymes were done in Europe, particularly Germany. These were primarily performed using animal pancreatic enzymes. A library search of literature dating back to the early 1900s shows that most studies were written in French, Italian and German. Very few studies were presented in English until the late 1930s, as found in the Index Medicus. Even today, most clinical studies recorded in the medical literature still employ animal-based enzymes (pancreatin) and are from Europe.

Common usage for pancreatic enzymes is in the treatment of pancreatic insufficiency diseases such as steatorrhoea (excessive amounts of undigested fat in stools), cystic fibrosis and pancreatitis. Results are mixed, but generally some help is obtained from pancreatin. While some of the inflammation is reduced to a degree, digestion is very little affected due to the fact that pancreatin does not work in the acidic pH of the stomach.

Plant enzymes, on the other hand, are known to have a much greater effect in these conditions due to the advantage of their broad pH range. A study out of England observed that a small amount of an acid-stable lipase from plant sources was as effectual as a 25-times larger dose of animal pancreatin.[2]

One experience of the author involved a gentleman diagnosed with pancreatic cancer, due in part to his alcoholism. His doctors prescribed pancreatin to aid with digestion and relieve inflammation. He was given six weeks to live. He had not found any relief with the pancreatin. Four weeks after he started a plant-based enzyme program, he lost touch with the author. The author succumbed to thinking he would never see this client again, due to his death. One year later, he ventured into a restaurant and there was the former client with his wife and son, enjoying a meal. The author asked in disbelief how he had survived. He explained he had continued taking plant enzymes, having purchased some from a health food store. He was still alive after several years, to the amazement of his doctors.

Plant-based enzymes work in a very broad pH range of about 2.0–12.0. This covers both the acidic and alkaline ranges and makes them ideal for digesting food. Remember, Dr Howell found a pre-digestion stomach in mammals, including humans. Based on the observations of Beazell et al. as well as other researchers, Howell reasoned that most digestion takes place in the stomach. Since plant enzymes survive extreme pH conditions, this makes them perfect for digesting protein, starches and fats in the stomach. This digestion in the stomach also relieves the pancreas of its enzyme-producing burden.

Plant enzymes are active in both acidic and alkaline environments, giving them greater access to digesting substances in blood, lymph and tissue that do not belong there.

When the body can get what it needs, when it needs it, it will perform wonders and even miracles.

Substrates: The Lock and Key

Lastly, *enzymes need a specific substrate (substance) on which to work*. The analogy most commonly used is that of a lock-and-key system. Enzymes are very exacting in what they can work on: if the key does not fit the lock, nothing can occur. Protease works only on splitting protein down into smaller protein peptides and amino acids. Lipase cleaves fats and oils into fatty acids. Cellulase breaks down cellulose, which is plant fibre. Pectinase works on pectin (fibre) from fruit. Fructase breaks down fructose, the sugar found in fruit. Sucrase breaks down sucrose, the sugar obtained from beets or sugar cane.

One of the most commonly discussed enzyme deficiencies is lactose intolerance—the inability to digest the sugar component of milk. It has been observed through associates of Dr Loomis that when someone is lactose intolerant, they are also usually intolerant of other sugars including maltose from grains and sucrose.

The enzymes necessary for digesting these sugars are produced by the villi of the small intestine. When someone overconsumes sugar in its many forms over time, they exhaust their body's ability to produce the specific enzymes necessary to digest those sugars. This is also the case with fructose when it is used as an additive derived from synthetic or even natural means, if enzymes are not present to digest it.

People who consume too much sugar also end up not being able to digest fats properly. This is especially true for women. The complex endocrine system of women warrants the ability to digest fats and proteins to ensure necessary hormone production throughout life, especially during menopause. Hormones are primarily produced from fats, proteins and minerals. In fact, the major steroid hormones (aldosterone, cortisol, oestradiol and testosterone) are derived from cholesterol.

Due to excessive sugar consumption during their lifetime and the inability to digest the sugar, so many women experience difficult menopause because of mineral deficiencies brought about by the sugar. Difficult menopause also stems from long-term problems of protein and fat digestion. The body uses food not only for energy but for tissue repair (which requires protein) and production of essential hormones.

The above example is true of any food that is consumed exclusively for long periods. Excessive consumption and the concurrent inability to digest those foods are known as *dietary stress factors*. Everyone is subject to dietary stress factors due to the repeated overconsumption of particular foods. The base of the food pyramid advocated by the medical community is built upon carbohydrates. It has become clear to many that this is a faulty representation of the ideal diet. The rapid rise in the incidence of diabetes, obesity and cardiovascular disease, especially in children, is the result of excessive carbohydrate and sugar intake and lack of exercise. The new kid on the block, *insulin resistance syndrome* (IRS), is just another example of the body's inability to digest and utilise sugar and simple carbohydrates properly. It is believed by many to be the precursor of type II diabetes. It is further evidence of enzyme deficiencies, specifically of the sugar and carbohydrate digesting enzymes.

Another group of enzymes, anti-oxidant enzymes, works on what are termed *free radicals*. Free radicals are the result of living in an industrial society. Externally they are caused by radiation, pollution and toxins, while internally they are the result of normal metabolism. They are molecules without a paired electron in their outer ring. Electrons hold molecules together. Normally, a stable molecule has a pair of electrons. It will become unstable and reactive if there is an unpaired electron in the outer ring. Very often, free radicals are composed of an unstable oxygen molecule which will cause damage to the lipid portion of the cell membrane. It can also affect the protein and DNA of the cell. Antioxidants, including enzymes, can prevent or stop the damage caused by free radicals.

Glutathione peroxidase splits hydrogen peroxide into water and a single stable oxygen atom. The main symptoms of excessive peroxide free radicals include heart and liver disease, premature ageing, and skin disease such as age spots, cancer, dermatitis, eczema, psoriasis and wrinkling. Glutathione peroxidase is dependent on the mineral selenium. If there is a deficiency of selenium in the soil and thus in the food consumed, there may be a hindrance in the body's ability to produce adequate amounts of glutathione peroxidase. Interestingly, epidemiological research in the United States and China shows areas with the lowest concentrations of soil selenium have the highest cancer rates, with the converse being true. This was first known in 1988[3] and later confirmed in the latter 1990s.

Superoxide dismutase (SOD) is an anti-oxidant enzyme responsible for cleaving the highly reactive superoxide radical O_2^- into hydrogen peroxide and protecting cells from dangerous levels of superoxide. Working in tandem with SOD is the enzyme catalase. It breaks down the hydrogen peroxide that is created by SOD's action on superoxide radicals. SOD/catalase deficiencies have been observed in inflammatory conditions, especially arthritis, bursitis and gout. In the field of anti-ageing medicine, it is believed that supplemental anti-oxidant enzymes can slow the ageing process. By curbing free radical processes, one may stop the damage done to cell membranes, strengthening the permeability of the cell and making it less prone to invasion by pathogens or environmental pollutants.

ABSORPTION OF EXOGENOUS ENZYMES

One of the arguments against using supplemental enzymes is that they are protein macromolecules and therefore are denatured or destroyed by the action of hydrochloric acid produced inside the stomach and, as such, they cannot cross the brush-border of the intestine intact. Another argument is that even if they did cross over, they are nothing more than a trigger for the production of endogenous enzymes. As described below, these and other arguments have been proven incorrect.

You are not necessarily what you eat, but what you can digest.

A macromolecule is a compound of 1,000 or more atoms bound together. There is overwhelming evidence that macromolecules do, in fact, cross the gut lumen intact. In 1904, Drs Ganghofer and Langer demonstrated that large protein molecules were absorbed across the intestinal gut without being degraded and were still capable of functioning.[4]

Morris documented the intact absorption of gamma globulin in newborns. He recounted how infants' first milk is colostrum, which sets up the infants' digestive immune function.[5] Both gamma globulin and colostrum are proteins. Professor Seifert of the University of Kiel not only demonstrated the absorption of gamma globulin but proved by means of immunological testing that the proteins were intact, entering the bloodstream unaffected and in full molecular size.[6–8]

Walker and others documented extensive work on the intestinal uptake of macromolecules in relation to immunisation.[9–11] Gardner specifically wrote about the gastrointestinal assimilation of intact proteins.[12, 13] Other animal and human studies have described numerous intact proteins including animal-based and plant-based enzymes being absorbed into the bloodstream following oral administration.[14–17]

In one study, cancer patients with known inflammatory conditions (deep and superficial thrombophlebitis of the extremities) were given doses of proteolytic enzymes either orally or intramuscularly of trypsin and chymotrypsin. Measurements of blood levels of both enzymes showed marked increases within 30 minutes, with a decline to base levels at the end of 24 hours. These results occurred with both orally administered and intramuscularly injected enzymes. Since the orally administered enzymes did increase the blood esterase substantially, it was concluded that "orally administered chymotrypsin and trypsin resulted in specific esterase activity changes in blood, indicating absorption of the enzymes given, rather than release of other enzymes from the intestinal tract".[18] Unfortunately, this study was only interested in whether or not proteolytic enzymes could be absorbed across the gut wall. There was seemingly no interest in what the effects might be from the enzymes themselves on the inflammation or cancer.

In another study, lipase was found to be circulating from across the intestinal lumen into the lymph system and back to pancreatic acinar cells, where the cycle repeated itself.[19] This circulation of enzymes via the lymph and blood systems is similar to the recycling of bile salts by the liver.

YOU ARE WHAT YOU CAN DIGEST!

Over the last century, doctors have sought to treat human ailments with a variety of natural and not-so-natural methods. Driven by the financial gains of pharmaceutical companies, research scientists have tried to unlock the secrets of nature to synthesise active ingredients of plants and animals. The amount of money spent on health care in the United States per person based on per capita income far exceeds any other country—yet there is rampant illness, with always the promise from pharmaceutical companies of yet another discovery just around the corner. Most people have come to expect the "magic bullet" pill that will do everything for them. Even in the natural health food industry, the latest vitamin/mineral supplements have everything except the kitchen sink thrown in for good measure.

In the early 1900s, radiation and surgery became the mainstays of treatments. By the 1940s, pharmaceutical drugs had turned into the miracle cures. We've moved into an entirely new and uncharted territory, becoming cocky with the analysis of genomes and the ability to tamper with life. Cloning of animals and production of genetically modified drugs are the next promise for the future. We are told that irradiated and genetically modified foods will feed the world, but at what cost?

All of the above factors will provide continuing evidence of enzyme deficiencies leading to more obscure and unrecognisable diseases. Biological and chemical terrorism now threatens our existence, but so does the manipulation of our food.

Throughout history, many scientific discoveries have been blighted by a blind spot. That spot is the gaping hole of the future of this planet, including everyone and everything on it. In the Hindu and Buddhist religions, *karma* is the principle of cause and effect. It has been described in many ways and in many languages by prominent religious leaders as well as physicists. Christians understand it as "What ye sow, so shall ye reap". What we do now will forever affect the world we live on and in. Clean food, water and air are essential for survival. We can control what we eat, drink and breathe, so long as we are informed and educated.

The ongoing work of Dr Loomis and his associates attests to the best-kept secret in the field of nutrition. You are not necessarily what you eat, but what you can digest. Improved digestion through plant enzymes should be the starting point in any health program. When the body can get what it needs, when it needs it, it will perform wonders and even miracles.

As Dr Howell said, "Without enzymes, life itself would not be possible".

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Mark Rojek began researching alternative therapies in 1970. His studies included botanicals, mineral and vitamin requirements and diet. He interned in acupuncture with Dr Bell in Windsor, Ontario, Canada, in 1973, and graduated in 1978 with a Bachelor of Science. He studied aromatherapy, kinesiology, massage therapy and classical homoeopathy in England. In 1986, Mark began formal studies in traditional Chinese medicine, especially acupuncture. In Chicago, he worked with several holistic physicians as a medical technician and maintained a private nutritional practice. Also in 1986, he met Dr Howard Loomis, foremost living expert in enzyme nutrition, and continues to work with him. He works with several doctors in Michigan who refer to him and seek his counsel. He continues to research, lecture and counsel clients in nutrition and diet.

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Editor's Note – Correction:

In Part 1 of this article, we included an incorrect conversion of the temperature of 118° Fahrenheit into degrees Celsius. The correct equivalent temperature should be 47.78°C. We apologise for the error and point out that it was not the fault of the author.